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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/863,737      | 05/23/2001  | Noriaki Oda          | 12562A              | 1794             |

23389 7590 09/25/2003

SCULLY SCOTT MURPHY & PRESSER, PC  
400 GARDEN CITY PLAZA  
GARDEN CITY, NY 11530

EXAMINER

LEWIS, MONICA

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2822

DATE MAILED: 09/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                               |                            |  |
|------------------------------|-------------------------------|----------------------------|--|
| <b>Office Action Summary</b> | Application No.<br>09/863,737 | Applicant(s)<br>ODA ET AL. |  |
|                              | Examiner<br>Monica Lewis      | Art Unit<br>2822           |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 July 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3-5, 7 and 8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-5, 7 and 8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 May 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☒ Certified copies of the priority documents have been received in Application No. 09/275,532.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

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### **DETAILED ACTION**

1. This action is in response to the request for continued examination filed July 18, 2003.

#### ***Response to Arguments***

2. Applicant's arguments with respect to claims 1, 3-5, 7 and 8 have been considered but are moot in view of the new ground(s) of rejection.

#### ***Claim Objections***

3. Claims 1 and 5 are objected to because of the following informalities: a) it appears that "wirings" is a error and should be "wiring." Appropriate correction is required.

#### ***Specification***

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: "the first SiOF insulating film is in contact with the wirings only at the wiring gap portion and is not in contact with the upper side of the wirings" (See Claims 1 and 5).

#### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. Claims 1, 3, 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art Figures in view of Usami et al. (Japanese Publication No. 10-056009) and Maex et al. (U.S. Patent No. 6,323,555).

In regards to claims 1 and 5, Applicant's Admitted Prior Art discloses the following:

a) a semiconductor device having a plurality of wirings (8, 15, 20) juxtaposed with one another (For Example: See Figure 1 and Figure 3); and

b) a SiOF insulating film (4, 9, 11, 12, 17) on the upper side of the wirings (For Example: See Figure 1 and Figure 3).

In regards to claims 1 and 5, Applicant's Admitted Prior Art fails to disclose the following:

a) the fluorine concentration of the SiOF insulating film at a wiring gap portion is set to be higher than the fluorine concentration of the SiOF insulating film on the upper side of the wirings.

However, Usami et al. ("Usami") discloses a semiconductor device where the fluorine concentration of the SiOF at the wiring gap is higher than the concentration of the insulating film on the upper side of wirings (For Example: See Abstract and Paragraph 40). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Applicant's Admitted Prior Art to include a higher fluorine concentration of SiOF at the wiring gap than the concentration of the insulating film on the wirings as disclosed in Usami because it reduces the capacitance among the wiring therefore resulting in a high operating speed (For Example: See Abstract and Paragraph 40).

Additionally, since Applicant's Admitted Prior Art and Usami are both from the same field of endeavor, the purpose disclosed by Usami would have been recognized in the pertinent art of Applicant's Admitted Prior Art.

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Finally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235.

b) the SiOF insulating film is in contact with the wirings only at the wiring gap portion and is not in contact with the upper side of the wirings.

However, Maex et al. (“Maex”) discloses a semiconductor device where the SiOF film is only at the wiring gap and not on the upper side of the wirings (For Example: See Figure 1H). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Applicant’s Admitted Prior Art to include SiOF film is only at the wiring gap and not on the upper side of the wirings as disclosed in Maex because it aids in low permittivity (For Example: See Abstract and Column 1 Lines 9-67 and Column 2 Lines 1-39).

Additionally, since Applicant’s Admitted Prior Art and Maex are both from the same field of endeavor, the purpose disclosed by Maex would have been recognized in the pertinent art of Applicant’s Admitted Prior Art.

In regards to claims 3 and 7, Applicant’s Admitted Prior Art fails to disclose the following:

a) thickness of the first SiOF film at a center of the wiring gap portion is within the range of  $1/3$  to  $1/1$  times of the thickness of the wirings.

However, the applicant has not established the critical nature of the dimension of  $1/3$  to  $1/1$  times of the thickness. “The law is replete with cases in which the difference between the

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claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.” *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990).

7. Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant’s Admitted Prior Art Figures in view of Usami et al. (Japanese Publication No. 10-056009), Maex et al. (U.S. Patent No. 6,323,555) and Nishiyama et al. (U.S. Patent No. 5,429,995).

In regards to claims 4 and 8, Applicant’s Admitted Prior Art fails to disclose the following:

a) fluorine concentration of the first SiOF film is set to 5 atom % or more, and the fluorine concentration of the second SiOF film is set to be less than 5 atom %.

However, Nishiyama et al. (“Nishiyama”) discloses a semiconductor device where the fluorine concentration of SiOF is greater and lesser than 5 atom % (For Example: See Column 4 Lines 30-32). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Applicant’s Admitted Prior Art to include SiOF where the fluorine concentration is greater and lesser than 5 atom % as disclosed in Nishiyama because it manipulates the power consumption and operating speed of the system (For Example: See Column 3 Lines 44-56 and Column 4 Lines 30-32).

Additionally, since Applicant’s Admitted Prior Art and Nishiyama are both from the same field of endeavor, the purpose disclosed by Nishiyama would have been recognized in the pertinent art of Applicant’s Admitted Prior Art.

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Finally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235.

***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 703-305-3743.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML  
August 26, 2003

  
**AMIR ZARABIAN**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2800**